

IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (Currently Amended) A switchable optical element comprising:

a fluid chamber including first and second bodies of fluid disposed relative to one another along an optical axis of the switchable optical element,

a third body of fluid within the fluid chamber disposed relative to the first and second bodies of fluid along the optical axis of the switchable optical element,

a first electrode coupled to the first body of fluid, ~~and~~  
a second electrode, and  
a third electrode,

wherein the second body of fluid is arranged to move

substantially transverse to the optical axis ~~in only one direction towards one side of the fluid chamber~~ in response to a voltage applied to the first and second electrodes and thereby change the transmissivity of the fluid chamber along the optical axis, and wherein the third body of fluid is arranged to move in a direction substantially transverse to the optical axis in response to a voltage applied to the first and third electrodes and thereby change the transmissivity of the fluid chamber along the optical axis.

2. (Previously Presented) The switchable optical element of claim 1, wherein the second fluid is a non-conducting liquid, and the first fluid is at least one of a polar liquid and a conducting liquid.

3. (Previously Presented) The switchable optical element of claim 1, further comprising a first contact layer forming an insulating barrier between the second electrode and the first and second bodies of fluid within the fluid chamber.

4. (Previously Presented) The switchable optical element of claim 3, wherein the first contact layer comprises a material with a higher wettability with respect to the second fluid than with respect to the first fluid.

5. (Previously Presented) The switchable optical element of claim 3, wherein the first contact layer comprises an amorphous fluoropolymer.

6. (Previously Presented) The switchable optical element of claim 3, wherein the first contact layer comprises a first area having a first wettability by the first fluid, and a second area having a second, higher wettability by the first fluid.

7. (Previously Presented) The switchable optical element of claim 3, wherein movement of the second body of fluid is caused by an electro-wetting effect.

8. (Previously Presented) The switchable optical element of claim 7, wherein the first contact layer comprises an area at which separation of the second electrode from the first and second bodies of fluid is reduced to locally increase the electro-wetting effect.

9. (Previously Presented) The switchable optical element of claim 7, wherein the first contact layer comprises an area which protrudes into the fluid chamber to locally increase the electro-wetting effect.

10. (Previously Presented) The switchable optical element of claim 1, wherein interior surfaces of the fluid chamber comprise an inhomogeneity arranged to increase reproducibility of motion of the second body of fluid in response to a voltage applied to the first and second electrodes.

11. (Previously Presented) The switchable optical element of claim 6, wherein the area of increased wettability is provided on the optical axis of the switchable optical element.

12. (Previously Presented) The switchable optical element of claim 1, wherein the second electrode comprises a plurality of independently addressable sections.

13. (Previously Presented) The switchable optical element of claim 12 wherein the independently addressable sections are arranged to provide different wettabilities across the first contact layer in response to a range of applied voltages.

14. (Previously Presented) The switchable optical element of claim 1, wherein the second electrode is transparent and arranged substantially transverse to the optical axis.

Claim 15 (Canceled)

16. (Currently Amended) The switchable optical element of ~~claim 15~~ claim 1, further comprising a second contact layer forming an insulating barrier between the third electrode and the bodies of

fluid within the fluid chamber.

17. (Currently Amended) The switchable optical element of ~~claims 15~~ claims 1, wherein the third body of fluid has a different transmissivity spectrum to the second body of fluid.

18. (Currently Amended) The switchable optical element of ~~claim 15~~ claim 1, wherein interior surfaces of the fluid chamber in contact with the first body of fluid when no voltage is applied to the switchable optical element are of higher wettability by the first fluid than by the second fluid.

19. (Previously Presented) The switchable optical element of claim 1, wherein all of said fluids are of substantially equal density.

20. (Previously Presented) The switchable optical element of claim 1, wherein the switchable optical element is at least one of a shutter, a diaphragm, a diffuse reflector or a filter.

21. (Currently Amended) An optical device comprising a switchable optical element, wherein the switchable optical element comprises:

a fluid chamber including first and second bodies of fluid disposed relative to one another along an optical axis of the switchable optical element, the fluid chamber further including a third body of fluid disposed relative to the first and second bodies of fluid along the optical axis of the switchable optical element,

a first electrode coupled to the first body of fluid, ~~and~~  
a second electrode, and  
a third electrode,

wherein the second body of fluid is arranged to move substantially transverse to the optical axis ~~in only one direction towards one side of the fluid chamber~~ in response to a voltage applied to the first and second electrodes and thereby change the transmissivity of the fluid chamber along the optical axis, and  
wherein the third body of fluid is arranged to move in a

direction substantially transverse to the optical axis in response to a voltage applied to the first and third electrodes and thereby change the transmissivity of the fluid chamber along the optical axis.

22. (Previously Presented) The optical device of claim 21, further comprising at least a further switchable optical element configured in series or parallel with the switchable optical element to provide switchable transmission characteristic for the optical device.

23. (Previously Presented) The optical device of claim 21 further comprising a lens.

24. (Original) The optical device of claim 23 wherein the lens is formed integrally with the switchable optical element.

25. (Previously Presented) The optical device of claim 23 wherein the lens is an adjustable electrowetting lens.



26. (Previously Presented) The optical device of claim 21, further comprising a device for scanning an information layer of an optical record carrier, comprising a first radiation source for generating a first radiation beam and an objective system for converging the first radiation beam on the information layer, and the switchable optical element is arranged to control the first radiation beam.

27. (Previously Presented) The optical scanning device of claim 26 further comprising a second radiation source for generating a second radiation beam of different wavelength to the first radiation beam, wherein the objective system is selectively arranged to converge the first or second radiation beam on the information layer, and the switchable optical element is further arranged to control the second radiation beam.

28. (Previously Presented) The optical scanning device of claim 26, wherein the switchable optical element is incorporated

into the objective system.

29. (Currently Amended) A method of manufacturing a switchable optical element, the method comprising the acts of:

providing a fluid chamber including first and second bodies of fluid disposed relative to one another along an optical axis of the switchable optical element; ~~and~~

providing a third body of fluid within the fluid chamber disposed relative to the first and second bodies of fluid along the optical axis of the switchable optical element; and

providing a first electrode coupled to the first body of fluid, ~~and a second electrode, and a third electrode;~~

wherein the second body of fluid is arranged to move substantially transverse to optical axis ~~in only one direction towards one side of the fluid chamber~~ in response to a voltage applied to the first and second electrodes and thereby change the transmissivity of the fluid chamber along the optical axis, and

wherein the third body of fluid is arranged to move in a direction substantially transverse to the optical axis in response

to a voltage applied to the first and third electrodes and thereby change the transmissivity of the fluid chamber along the optical axis.

30. (Currently Amended) A method of manufacturing an optical scanning device for scanning an information layer of an optical record carrier, the method comprising the acts of:

providing a first radiation source for generating a first radiation beam;

providing an objective system for converging the first radiation beam on the information layer; and

providing a switchable optical element arranged to control the first radiation beam, wherein the switchable optical element comprises:

a fluid chamber including first and second bodies of fluid disposed relative to one another along an optical axis of the switchable optical element,

a third body of fluid within the fluid chamber disposed relative to the first and second bodies of fluid along the optical

axis of the switchable optical element,

a first electrode coupled to the first body of fluid, and

a second electrode, and

a third electrode,

wherein the second body of fluid is arranged to move

substantially transverse to the optical axis ~~in only one direction~~

~~towards one side of the fluid chamber~~ in response to a voltage

applied to the first and second electrodes and thereby change the

transmissivity of the fluid chamber along the optical axis, and

wherein the third body of fluid is arranged to move in a

direction substantially transverse to the optical axis in response

to a voltage applied to the first and third electrodes and thereby

change the transmissivity of the fluid chamber along the optical

axis.